



F10.8 Layers

Networks · GCSE · OCR J277 1.3.2, AQA 8525 3.5, Edexcel 1CP2 4.1.7 ·
about 15 min

Name _____

Class _____

Date _____

What this lesson is about

The four-layer TCP/IP model, encapsulation, and why layers are used.

- The TCP/IP model
- Down one side, up the other
- Why layers?

Questions

5 marks in all

1. Put the TCP/IP layers in order, from the top. [1 mark]

Number the lines 1 to 4 to put them in the right order.

___ Application

___ Transport

___ Link

___ Internet

2. At which layer does HTTP work? [1 mark]

- ☐ A Application
☐ B Transport
☐ C Internet
☐ D Link

3. Which layer adds IP addresses and routes packets between networks? [1 mark]

- ☐ A Internet
☐ B Application
☐ C Transport
☐ D Link

4. Which is an advantage of using layers? [1 mark]

- ☐ A One layer can be changed without changing the others
☐ B Data is sent without headers
☐ C It removes the need for protocols
☐ D Only one company can make network software

5. What does this program print?

[1 mark]

```
frame = "IP 1>2 | TCP 80 | hello"
for n in range(2):
    frame = frame.split(" | ", 1)[1]
print(frame)
```

The task: wrap and unwrap

Write `wrap(data, headers)` and `unwrap(frame)`. `wrap` adds each header in `headers`, in order, in front of the data with `|` between, printing `<layer>: <data so far>` after each (starting with `application: GET /battery` before any header). Send the finished frame by radio. Then `unwrap` removes the three headers, and you print `received by application: <data>`.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

data = "GET /battery"
names = ["transport", "internet", "link"]
headers = ["TCP 80", "IP 10.0.0.2>10.0.0.9", "WIFI 3C-02>3C-09"]
```

Plan your program here, then type it in and press Run.



Do it on the robot

www.bugbotlab.com/learn/f10-8-layers/

The simulator checks it and tells you when it passes. Nothing to install, no account.

Challenges

1. Change the link layer header to `ETH 3C-02>3C-09`. Which other lines had to change?
2. A router reads the internet layer header but not the application data. Print just the header a router needs.
3. Match each device to the highest layer it reads: switch, router, web browser.